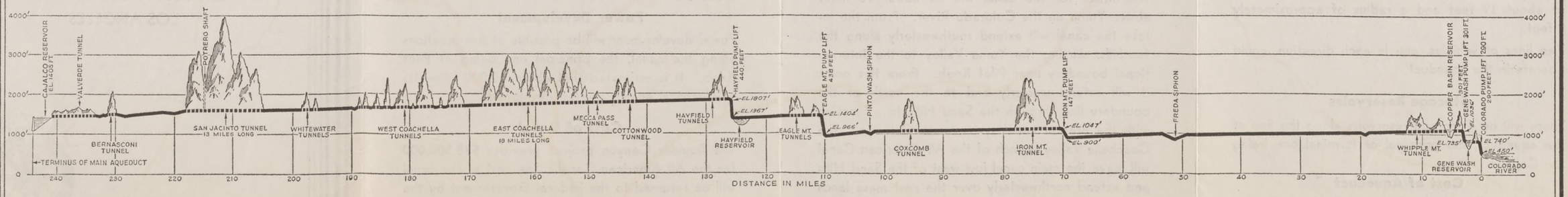
MAP SHOWING ROADS TO BOULDER CANYON PROJECT AND COLORADO RIVER AQUEDUCT

SCALE IN MILES 0 1 2 4 6 8 10 12 14 16 18 20

MAP SERVICE
AUTOMOBILE CLUB OF SOUTHERN CALIFORNIA
2601 SO. FIGUEROA ST. LOS ANGELES.
COPYRIGHTED

COLORADO RIVER AQUEDUCT
LEGEND
TUNNELS
LINED CANAL
PRESSURE PIPE LINE OR CONDUIT

PROFILE OF COLORADO RIVER AQUEDUCT



PFLUM

1518

WHT
7

Map

SHOWING ROADS

TO

BOULDER CANYON PROJECT

(HOOVER DAM)

AND

COLORADO RIVER AQUEDUCT

AUTOMOBILE CLUB OF SOUTHERN CALIFORNIA

2601 SOUTH FIGUEROA STREET

LOS ANGELES

The Friend to all Motorists since 1900

BOULDER CANYON • PROJECT •

THE Hoover Dam and Boulder Canyon project, now under construction by the Federal Government, consists of a dam and power plant on the Colorado River near the head of Black Canyon about thirty miles southeast of Las Vegas, Nevada, a water storage reservoir back of the dam and the All American Canal which will carry water from a point on the Colorado some fifteen miles above Yuma to the Imperial and Coachella Valleys of California.

Purpose

The project is being constructed to regulate the flow of the Colorado River and to conserve its waters for agricultural and domestic purposes. The development of power is a by-product rather than one of the primary purposes of the project.

A Federal Project

The project is being constructed by the Federal Government under the direct supervision of the Bureau of Reclamation.

Cost

The Congress has authorized appropriations not to exceed $165,000,000 for carrying out the project, as follows:

Dam and reservoir	$70,600,000
All American Canal	38,500,000
Power development	38,200,000
Interest during construction	17,700,000

Federal Government Investment to be Returned

The investment of the Federal Government in the Boulder Canyon project will be repaid through the sale of power and by the Imperial Valley Irrigation District of California.

Project to be Constructed Over a Period of Seven Years

The contract for the construction of the dam and appurtenant structures provides for completion within seven years from April 20, 1931.

Work Being Performed Under Contract

A group of contractors, known as "The Six Companies," are constructing the dam and appurtenant structures by contract under the supervision of the Federal Government.

The Hoover Dam to be Highest in the World

Height above low water level of river about	587 feet
Depth of foundation below low water level about	143 feet
Height of dam above bedrock about	730 feet
Width at top	45 feet
Width at base	650 feet
Length along top	1,180 feet

A roadway across the dam will provide highway communication between the States of Arizona and Nevada.

Type of Dam—"Arch Gravity" in which weight of impounded water is resisted by both the weight and arch action of the dam.

Volume and Weight—There will be about 3,400,000 cubic yards of concrete in the dam itself and its weight will be about 7,000,000 tons.

Storage Reservoir

The reservoir formed by the Colorado River and its tributaries will hold when full 30,500,000 acre feet of water.

Surface area	227 square miles
Length of reservoir	115 miles
Shore line of reservoir	550 miles

Characteristics of Colorado River

Maximum measured flow—240,000 cubic feet per second at Yuma. (1 cu.ft.=7.48 U. S. gallons.)

Minimum flow—66 cubic feet per second measured at Yuma.

Average flow at dam site—22,000 cubic feet per second.

Average annual run-off at dam site—15,700,000 acre feet.

The irrigable lands watered by the Colorado River below the dam at times require the entire low water flow of the river, and are frequently threatened with water shortage. Without storage, therefore, other available lands cannot be placed under water and present lands are not at all times assured of sufficient water. These irrigable lands are also subject to the menace of flood. The impounding of flood waters back of the dam will assure ample water for irrigable lands and relieve the area below the dam of flood menace. The Colorado River carries, it is estimated, annually 137,000 acre feet of silt. Without control this silt is eventually deposited in the network of canals and lateral ditches throughout

the irrigation area. The dam will cause the river to deposit its silt on the floor of the reservoir, thus relieving the irrigation districts of a large annual expense in canal and ditch cleaning.

It is estimated that at the end of fifty years about 3,000,000 acre feet of silt will have been deposited upon the floor of the reservoir. This is equivalent to about one-fifth the capacity of the reservoir.

Power Development

The power plant immediately below the dam will have a rated capacity of 1,835,000 horse power.

Average output about 663,000 horse power.

Water will be dropped through four pressure tunnels (two on each side of river) under an average head of 530 feet to 17 hydraulic turbines. These turbines will in turn operate 17 generator units, developing upon completion of project 4,330,000,000 kilowatt hours of electrical energy. (The output of power plant will decrease slightly with upstream development.)

Power plant will be operated by the City of Los Angeles and the Southern California Edison Company.

Electrical energy developed at the dam will be used by the States of Arizona and Nevada, the Metropolitan Water District, the City of Los Angeles and other Southern California Municipalities, and the Southern California Edison Company.

Estimated annual income from sale of power, $7,200,000.

The Federal Reservation

The Federal Government has withdrawn from entry all public land within and surrounding the dam and reservoir and this area now constitutes a federal reservation and is policed and administered by federal authorities.

Boulder City

Boulder City is in the federal reservation and is located 6 miles west of the dam, and is the administrative center for the dam project.

The Federal Government laid out the townsite, provided quarters for its employees, office buildings, municipal building, school, warehouse and garage, laid out and constructed streets, lighting, sanitary and water systems. A section of the townsite was set aside for the contractor's use, upon which he has built a mess hall, dormitory, hospital, club, machine shop, garage, laundry and 700 employees' cottages.

Water for Boulder City is pumped a distance of 7 miles from the Colorado River with a total lift of about 2,000 feet. It is passed through a filtration and purification plant and stored in a 2,000,000 gallon tank for distribution to the city as required.

The area of the city is about 500 acres and the population about 5,000.

THE COLORADO RIVER AQUEDUCT

THE Colorado River Aqueduct extends from a point on the Colorado River about 17 miles above Parker westerly to the Cajalco storage reservoir located a few miles southeast of Corona, Riverside County.

Purpose of Aqueduct

The aqueduct is being constructed to supply water to the Metropolitan Water District of Southern California.

The Metropolitan Water District

The district was created under legislative authority and consists of a number of cities, including the City of Los Angeles, located in Los Angeles, San Bernardino, Riverside and Orange Counties. These member cities will share in the cost of the aqueduct and appurtenant structures and will in return receive water to meet their present and future needs.

Length of Aqueduct

The aqueduct will have a length of about 240 miles. The lines distributing water to the District from the Cajalco reservoir will total about 155 miles in length.

Diversion Dam and Intake

A diversion dam, 72 feet in height, will be constructed in the Colorado River about 17 miles north of Parker to insure a constant water supply at the intake. Water for irrigation purposes below will flow over this diversion dam.

Capacity of Aqueduct

The aqueduct is designed to carry 1,500 second feet of water. This is equivalent to about 1,000,000,000 gallons daily, which is adequate for the daily domestic requirements of 10,000,000 people.

Elevations Along Aqueduct

The elevation at the intake on the Colorado River is 450 feet, and at the outlet in the Cajalco reser-

voir 1,405 feet. Intervening ground elevations along the aqueduct route range from 1,000 feet at the west foot of the Whipple Mountains to about 3,000 feet in the Chocolate Mountains and 4,000 feet in the San Jacinto Range.

General Design of Aqueduct

Two pumping plants will lift the water in two stages from the intake to a point in the Whipple Mountains 591 feet above the river. From this point the water will flow by gravity for a distance of about 70 miles to the east slope of Iron Mountain. From this point and in a distance of about 56 miles the water will again be raised in three stages a total height of about 1,025 feet to the Shaver's Summit from where it will flow by gravity to the Cajalco reservoir.

Total height water will be raised, 1,616 feet.

Power for Pumping

The five pumping plants to be installed along the aqueduct will be electrically operated. The Metropolitan Water District has been allocated 36% of the energy generated at Boulder Dam for aqueduct operation.

Tunnels

The Colorado River water on its way to the Metropolitan Water District will pass through 29 tunnels totaling 91 miles in length. The East Coachella tunnel through the Little San Bernardino Mountains is the longest and will have a length of 18 miles. The diameter of the tunnels will be about 16 feet.

Open Canals, Conduits and Siphons

There will be 67 miles of open canal, 55 miles of buried conduit and 27 miles of siphon. The typical cross-section of the open canal will have a bottom width of 20 feet, a top width at water level of about 50 feet and a normal water depth of about 10 feet. The typical section of buried conduit will have a semi circular cross-section with a base width of about 19 feet and a radius of approximately 8 feet.

Two lines of vehicles, one in each direction, could operate in the aqueduct.

Storage Reservoirs

There will be 4 storage reservoirs along the line of the aqueduct, the principal or terminal one being the Cajalco.

Cost of Aqueduct

The Metropolitan Water District has authorized a bond issue in the amount of $220,000,000 to defray

the cost of the aqueduct, distributor system and appurtenant structures.

Time Required to Construct

It has been estimated that about five to six years will be required to construct the Colorado River Aqueduct. The work program has been timed so that its completion will be on approximately the same date as the completion of the Boulder Canyon project.

THE ALL AMERICAN CANAL

THE All American Canal is a part of the Boulder Canyon project and is being built to carry water from the Colorado River to the irrigable lands of the Imperial and Coachella Valleys of California. It is called the All American Canal because it will lie entirely within the United States as opposed to the present canal serving the Imperial Valley which lies partly in Mexican territory.

Purpose of Canal

The present canal serving the Imperial Valley has its intake a few miles below Yuma in Mexican territory. From the intake it extends westerly and to the south of the International boundary some 45 miles to a point near Calexico where it enters the Imperial Valley of California. The canal lies at too low an elevation to serve by gravity all of the irrigable lands of the Imperial and Coachella Valleys. The All American Canal will lie entirely within the territory of the United States, will have a greater capacity than the present canal and will serve a large area of irrigable lands which cannot be served from the present canal.

Location of Canal

The intake for the canal will be about 15 miles above Yuma on the Colorado River. From the intake the canal will extend southwesterly along the foothills, skirting the Yuma Valley to the International boundary near Pilot Knob. From this point it will extend westerly and to the north of the boundary line through the Sand Hills to a junction with the present canal system near Calexico. The Coachella Valley branch of the All American Canal will leave the main canal just west of the Sand Hills and extend northwesterly over the east mesa lands of Imperial County and along the Salton Sea to the Coachella Valley. Crossing the Coachella Valley

just above the town of Coachella it will extend southeasterly to the Riverside-Imperial County line.

Length of Canal

The main, or Imperial Valley Canal will have a length of about 80 miles.

The Coachella branch will have a length of about 130 miles.

Diversion Dam

The diversion dam at the intake 15 miles above Yuma will be of the floating wier type and will raise the water surface of the river about 22 feet. It will have a length of about 1,700 feet.

Capacity of Canal

The canal is designed to carry 15,000 cubic feet of water per second, or about ten times the capacity of the Colorado River Aqueduct. Of the 15,000 second feet diverted at the intake, 2,000 second feet will be delivered to the Yuma Reclamation project and 3,000 second feet will be used for power development at Pilot Knob.

General Design Features of Canal

The maximum cross-section of the canal will have a width of 200 feet at the water surface, a bottom width of 134 feet and a depth of 22 feet. This will be the largest canal used for irrigation purposes in the United States. There will be 10 siphons, or culverts, on the main canal and 79 on the Coachella canal. The main canal will be carried under the Alamo and New Rivers by siphons.

The Sand Hills

About 10 miles of the canal will pass through the so-called Sand Hills in southeastern Imperial County. A maximum cut of over 100 feet in depth will be required in this area. It is proposed to protect the canal from drifting sand by planting with vegetation a zone on each side, or by covering the sand with a coarser material, or by spraying the sand with crude oil.

Power Development

Power development will be possible at five locations along the canal, the principal one being at Pilot Knob. It is estimated that about 60,000 kilowatts of electrical energy can be developed.

Cost of Canal

The Boulder Canyon project provides $38,500,000 for the All American Canal. The cost of the canal will be returned to the Federal Government by the irrigation district as provided in the Federal Reclamation law.

WHT.M.0076